ing the morning hours and lasts only half a day. If copulation does not take place during this period, the female may rut again in the course of several weeks. Such females also from which the young are prematurely removed from the pouch or marsupium, allow themselves to soon again become pregnant. During the rutting period the walls of the uterus thicken very perceptibly, and principally because of the enlargement of the uterine lymph-spaces, in which the uterine glands then appear to be suspended and to float.

"3. The fertilization of the eggs always occurs five days after copulation and at the lower end of the oviduct, where the latter widens into the uterus. In the vermicularly bent oviducts no spermotozoa are encountered.

"4. Gestation lasts for exactly eight days; then thirteen days after copulation the young are transferred to the marsupium. Development accordingly proceeds with extraordinary rapidity. Only three days before birth do the amniotic folds close over the back of the embryo.

"5. The egg is intermediate in character between the meroblastic and holoblastic type. During segmentation, there is aggregated at the aplastic pole of the egg a nutritive yolk, which at first lies quite outside of the ectoderm, though three days later the neighboring ecto- and mesodermal cells grow over the yolk, which thus becomes surrounded or imbedded by them, but the yolk is never included by the umbilical vesicle (intestinal or entodermal cavity)! Remnants of the yolk persist up to the third day before birth.

"6. The fertilized but unsegmented egg measures almost .5^{mm} in diameter; in the course of twenty-four hours the blastodermic vesicle measures 1^{mm}; in thirty-six hours 1.5^{mm}; in sixty hours 4^{mm}; in seventy-two hours 8^{mm}; in ninety-six hours 14^{mm}, and on the sixth day after the commencement of segmentation as much as 20^{mm} in diameter.

"7. The blastodermic vesicles at first lie quite free and scattered in the uterus; on the fourth day (after the beginning of segmentation), the blastodermic vesicle over the germinal area becomes very loosely adherent to the uterine epithelium.

"8. In the marsupium of the mother there were never more than six young observed. But the number of embryos [found in the uterus] is invariably much greater and varies, according to the size and strength of the female, from nine to twenty-seven."

PHYSIOLOGY.[1]

THE ACTION OF SULPHATE OF SPARTEINE ON THE HEART.—The alkaloid sparteine was discovered by Stenhouse in *Spartium scoparium*, a species of Genista, in 1850. It is a bitter liquid, insoluble in water. Treated with an excess of sulphuric acid, it forms a

[1] This department is edited by Professor HENRY SEWALL, of Ann Arbor, Michigan.

salt which crystallizes, and dissolves readily in water. M. Sée has made clinical observations with the use of this drug and, according to his results, it is of most extraordinary value in the treatment of various forms of cardiac trouble. Doses of 0.1 gramme of the sulphate of sparteine when given to a patient produced no disturbance of the digestive or nervous system; its effects seemed to be limited to the heart. In fibrous cardiac degeneration a single dose rendered the pulse-tracing normal for the period of three or four days. In irregular rhythm of the heart-beat due to insufficiency of the auriculo-ventricular valves or to contraction of their orifices, the drug brings back the normal rhythm. Three results follow the exhibition of sulphate of sparteine: 1. Its restorative effects upon heart and pulse; in this respect it equals digitalis, and its tonic action is very much more prompt, pronounced and lasting. 2. As a regulator of the rhythm of heart-beat, it stands unrivaled. 3. It causes acceleration of the pulse, and approaches belladonna in usefulness where need of the latter drug is indicated.—*Comptes Rendus, T. ci, p. 1046.*

THE MICROBE OF HYDROPHOBIA.—M. Fol has found in sections of the spinal cord and brain of animals dead from rabies, a micrococcus which he thinks is peculiar to that disease, and probably its etiological factor. The fresh tissue is hardened in a solution of 2.5 per cent bichromate of potash, and 1 per cent sulphate of copper, and the sections are stained with hæmatoxylin. The micrococci are lodged usually in the neuroglia, but more rarely in the nerve-fibers themselves. An artificial culture of the micrococci in healthy cerebro-spinal fluid produced characteristic hydrophobic symptoms in animals which received injections of it in the brain. —*Comptes Rendus, T. ci, p. 1276.*

THE TRANSFORMATION OF PEPTONES BY THE LIVER, AND THE RELATION OF THE SUGAR IN THE BLOOD TO THE NATURE OF THE FOOD SUPPLY.—As previously reported in these pages, Professor J. Seegen, of Vienna, undertakes to prove that the peptones absorbed from the alimentary canal are destroyed in the liver, giving rise to sugar as one of the products of decomposition. If this hypothesis be correct, we must expect that some other body containing the nitrogen of the peptones must be formed at equal rate with the sugar. It was to establish this fact that Seegen's later work was undertaken. The following method was finally adopted as likely to give results most free from error: Two pieces were cut from the liver of a dog just killed, weighed and finely minced. The portions were placed in two glass vessels containing from 50 to 100^{cc} of defibrinated blood from the same dog. To the blood in one of the vessels a peptone solution was added, and to the other a like volume of pure water. By means of aspirators a stream of air was passed through each vessel for the period of three to five hours. At the end of that time a given quantity of

blood was drawn from each vessel, all albuminous matters were precipitated with great care, and the fluid remaining was tested, after concentration, as to its content of nitrogen. The author discusses fully various methods employed in the separation of minute quantities of albuminous substances from complex mixtures. The results of these experiments indicate a very considerable destruction of peptone by the liver with the formation of a corresponding amount of a nitrogenous product of the decomposition.

Seegen was led to the choice of peptone in his study from the fact that Schmidt-Mülheim had found that most of the albuminous bodies digested in the stomach were changed to peptones, and because the researches of Plosz and Gyergyai had showed that the blood of the hepatic vein contained but traces of peptones, while that of the mesenteric veins was rich in them, the conclusion being that the liver was the principal seat of the destruction of peptones. In respect to the formation from peptones of carbohydrates by the liver, the author found that, in experiments performed in the manner described above, not only was the sugar content of the peptone-liver-blood increased 20-70 per cent above the liver blood without peptone, but the total amount of carbohydrates was increased as well. The conclusion is reached that the function of the peptones, at least in carnivorous animals which are not changing in weight, is, for the most part, to give rise to the formation of sugar in the liver.

In another article the same author discusses the influence of variation and nature of the food supply on the presence of sugar in the blood. In the hungering animal (dog), the blood of the hepatic vein is constantly richer in sugar than that of the portal vein, the relative amounts being nearly two to one. The formation of sugar is, then, a continuous function of the liver. Calculation shows that it is hardly possible that this sugar formed during hunger could have come from previously stored carbohydrates. When an animal is fed on food rich in starch, the sugar content of the portal-vein blood is only very rarely increased; the large amount of sugar in the hepatic vein cannot therefore owe its existence directly to sugar entering the liver.

The percentage of sugar in arterial blood is nearly constant in the various conditions of hunger, or when the animal is fed upon starch, dextrine or sugar; the blood from the carotid artery, however, holds a slightly greater amount of sugar during the hours when sugar is being most rapidly absorbed from the alimentary canal.

The blood of the portal vein contains the same percentage of sugar on a starch diet as in hunger, but the sugar content increases when sugar is taken in the food, and to a still greater extent when a mixture of sugar and dextrine is eaten. The blood of the hepatic vein always contains a larger percentage of sugar

than that of the portal vein, not only during hunger, but after all manner of carbohydrate diet. The formation of sugar in the liver has nothing to do with the sugar ingested with the food. The formation of sugar by the liver persists throughout a prolonged period of inanition, and is not increased when a large amount of carbohydrate is fed to the animal. Seegen does not believe that the glycogen found normally in the liver is the source of the sugar of the hepatic vein; it probably has some special destiny, perhaps the formation of fat. The amount of glycogen found in the liver stands in very close relation to the amount of carbohydrate in the food.—*Pflüger's Archiv., 1885, pp. 325 and 348.*

PLETHYSMOGRAPHIC AND VASO-MOTOR EXPERIMENTS WITH FROGS. —Dr. Ellis has followed Drs. Bowditch and Warren in a series of investigations which bids fair to open the way to much that is new and valuable concerning the vaso-motor mechanism. The latter observers studied by the graphic method the variations of volume produced in the hind leg of a curarised cat by electrical stimulation of the sciatic nerve. The volume of the limb was measured by the plethysmograph, and any fluctuations in it could only be due to variation in the amount of blood supply. The authors found when the peripheral end of the nerve was excited by rapidly repeated induction shocks (16–64 per sec.), there was usually contraction of the vessels. When a slower rate was employed (4–0.2 per sec.), there was dilatation. With a medium rate of stimulation there followed first a narrowing and afterward a dilatation. A latent period of 1.5 sec. preceded the constriction, and one of 3.5 sec. the dilatation. The latter effect sometimes persisted for several minutes after cessation of the stimulation, but the former usually ceased with it.

By an exceedingly ingenious application of a test-tube plethysmograph connected with very delicate registering tambours, Dr. Ellis has been able to study the vaso-motor changes produced in the leg of curarised frogs by stimulation of the sciatic nerve. The general results agree very well with those already obtained on the cat. In general, slow interruptions (1 or 2 per sec.) caused dilatation, while rapid stimulation (15 per sec.) caused contraction. The author remarks: "In studying the varying effects of electrical stimulation upon the blood-vessels, several factors must be considered. 1. *The intensity of the induction shocks.* The greater the intensity of the shocks, other conditions remaining the same, the greater the tendency to immediate contraction on the part of the blood-vessels. The converse of this is in a measure true, namely, the weaker the stimulus, the greater the tendency to immediate dilatation. 2. *The number of induction shocks per second.* The greater the number of shocks per second, the greater the liability to contraction, and conversely. 3. *Duration of the stimulation.* The longer a series

of weak shocks rapidly following one another is applied, the more likely is it to cause contraction."

The intensity of the slowly repeated shocks which produced dilatation, was usually much greater than that of the rapid stimulation which caused constriction; but when the total stimulations to which the nerve is subjected, obtained by multiplying the intensity of each shock by the number of shocks applied, are compared in the two cases, it is found that when dilatation is obtained, the total stimulation is much less than when constriction is caused. These experiments indicate the existence of two separate peripheral vaso-motor mechanisms, one having the function of vaso-constriction, and the other of vaso-dilation.—*The Journal of Physiology, Vol. vi, p. 437.*

PSYCHOLOGY.

ANTHROPOLOGY AND PSYCHOLOGY.—At the Aberdeen meeting of the British Association for the Advancement of Science, Dr. Alexander Bain, lord rector of Aberdeen University, read a paper "On the scope of anthropology, and its relation to the science of mind." He endeavored to point out that the bringing together of the six departments—named respectively man's place in nature, the origin of man, the classification of races, the antiquity of man, language and the development of civilization—did not contribute to the mutual elucidation of the several topics, but merely concentrated into a whole the subjects connected with the higher mysteries of man's origin and destination. He next dealt at length with a survey of the researches having in view precise measurements of the bodily and mental characteristics of human beings, and indicated lines on which research might be made so as to reflect new light on our intellectual constitution. The author also reverted to the research into the conditions and the measure of memory as wholly within the means of actual experimental determination; also the important intellectual function of seeing similarity in the midst of diversity, which can be reduced to more or less precision of estimate by suitable means. Taking along with these results the inquiries into the faculties of the lower animals, the author put special stress on the number and delicacy of their senses as the foundation of every attempt to explain the higher aptitudes. Intelligence commenced with the power of discrimination, and increased as that power increased. The record of marvelous feats of exceptional ingenuity was of very little aid in revealing the secrets of the animal mind. In conclusion, he urged the admission of psychology in a more avowed and systematic form into the anthropological section. He would exclude the topics of metaphysical and ethical controversy, and welcome all the researches into the intellectual and emotional regions of the mind. Dr. Burdon Sanderson said any one teaching physiology would not be expected to include anthropology, and Dr.